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Annual Progress Report of the Forest Survey Br. of the Forest Deptt.

1893 - 94

Sub. - Forest / Admn. Report /

Year :-

1893 - 94

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ANNUAL PROGRESS REPORT

OF THE

FOREST SURVEY BRANCH OF THE FOREST DEPARTMENT

FROM 1ST OCTOBER 1893 TO 30TH SEPTEMBER 1894.

1893-94

BY

W. H. REYNOLDS, ESQ., F.R.G.S.,
SUPERINTENDENT OF FOREST SURVEYS.

The operations of the Imperial Forest Survey Branch that are now reported on are for the period 1st October 1893 to 30th September 1894, or for the Survey year 1893-94.

Direction and superintendence.

2. The operations were conducted under the orders of the Inspector General of Forests, and the administrative charge of the Branch, as well as the general superintendence of the several field detachments, were, throughout the year, in the hands of Mr. W. H. Reynolds, Superintendent of Forest Surveys.

THE SEASON'S FIELD WORK.

Surveys in progress.

3. The principal operations were in continuation of those of last year, *viz.*, in the districts of Narsingpur, Raipur, and Balaghat of the Central Provinces, in Bashahr in the Punjab, the Kheri District in Oudh, and the Salween forests and Pyinmana District in Lower and Upper Burma.

New surveys.

4. In addition to these, forest surveys were extended into the Gonda District in Oudh and the Sathpura Range of forests extending through the Districts of Nagpur, Seoni and Chindwara in the Central Provinces; and the services of a Native Surveyor were placed at the disposal of the Deputy Commissioner of Goalpara in Assam to align and clear the $\frac{\text{Bhutan}}{\text{Goalpara}}$ boundary, which had been demarcated during the previous year.

Field detachments.

5. The field parties were divided into detachments each of which worked under European supervision, or under an experienced and skilled Native Assistant, and the survey operations of each detachment were as follows:—

Central Provinces.

i. Narsingpur—4″ topographical survey, 16″ boundary surveys and record of distribution of forests and classification of soils.

ii. Raipur—4″ topographical survey, 16″ boundary surveys, levelling and record of distribution of forests and classification of soils.

iii. Balaghat—4″ topographical survey, 16″ boundary surveys, triangulation and record of distribution of forests and classification of soils.

Central Provinces —*contd.*	iv.	Nagpur, Seoni, Chindwara	4″ topographical survey, 16″ boundary surveys, triangulation and record of distribution of forests and classification of soils.
Punjab .	v.	Bashahr—4″ and 1″ topographical survey, and record of distribution of forests.	
Oudh .	vi.	Kheri, Gonda	4″ topographical survey, traversing, levelling and record of distribution of forests.
Lower Burma	vii.	Salween—4″ topographical survey and record of distribution of forests.	
Upper Burma	viii.	Pyinmana—4″ topographical survey, triangulation, traversing and forest distribution record.	
Assam .	ix.	Goalpara—4″ boundary survey.	

6. The strength of the establishment employed during the field season is shown in the margin. Two officers of the Controlling Staff of the Forest Department, *viz.*, Messrs. T. A. Hauxwell and C. E. Muriel, Deputy Conservators of Forests, also rendered assistance in supervising generally the detachments working in their Divisions in Burma, as well as the arrangements for labour and supplies for the several Surveyor's camps.

Strength of field Establishment.

Mr. E. Litchfield, Assistant Superintendent.
Mr. J. S. Marten, Extra-Assistant Superintendent.
Mr. J. Marten, Sub-Assistant Superintendent.
Mr. J. H Nichol, ditto ditto
Mr. C. Litchfield, ditto ditto.
Ninety-three Surveyors, Sub-Surveyors and others.

7. The average duration of the field season for the detachments working in the Central Provinces was 6½ months, those working in the Himalayas were out for about 4 months and the Oudh and Burma detachments were in the field for 7 and 5 months, respectively.

Duration of field season.

8. The total outturn for the year of areas operated on is as follows :—

Season's outturn.

Triangulation		1,950 square miles.
Traversing		936 „ „
Topographical Survey	16″ scale 111 4″ scale 1,322 1″ scale 287	1,720 „ „
Spirit levelling		165 linear miles.

The details of the above work will be found in Appendix A, and in Appendix B will be found the professional results of the season's operations, whilst the classes of areas surveyed are given in Appendix F.

9. As compared with the average of the previous two years the area triangulated shows an increase of 460 square miles, the traversing 531 square miles, and the topographical survey an increase of 25 square miles.

Comparison with past two years.

10. For all areas surveyed on the 4″ scale a record was prepared whilst the surveys were in progress, illustrating the distribution of forests, and for the forests in the Central Provinces the classifications of soils was also recorded.

Forest growth and soil records.

11. Instrumental contours were run in the Central Provinces and Bashahr surveys at 250 and 500 feet vertical intervals, and the topography was also tested by running lines of check surveys through the work were possible.

Check Surveys.

12. Mr. W. H. Reynolds, Superintendent of Forest Surveys, visited in turn each of the field detachments and satisfied himself that the field work was being efficiently conducted and that the accounts were in proper order.

Superintendent's inspection.

OFFICE WORK.

Head-quarters Office.

13. The head-quarters office of the Forest Survey Branch continues to be located at Dehra Dun, and throughout the year it has been under the direct supervision of Mr. W. H. Reynolds. The following branches of work are dealt with :—

i. Correspondence, Accounts and Forest Department map records.

ii. Final computations of the several field detachments and areas.

iii. Drawing and compiling of special maps for the Forest Department.

iv. Training of Surveyors for forest works.

v. Other miscellaneous work for the Forest Department.

Computations

14. An abstract of the season's computations will be found in Appendix A. The number of triangles computed in duplicate was 747, and the rectangular co-ordinates of 388 trigonometrical points and 5,230 traverse stations were deduced. To determine the heights above sea level of 702 stations, 747 additional triangles were computed. From latitude and longitudinal values, the rectangular co-ordinates of 713 points were deduced and 20,548 co-ordinates of Revenue Survey stations were converted into rectangular co-ordinates referrible to Forest Survey stations of origin. From 7,118 observations with the tangent scale clinometer the heights above sea level of 3,720 points were computed, and abstracts were prepared from triangulation field books of 1,969 horizontal angles.

All the above computations were worked in duplicate.

Areas.

15. Under the head of deductions of areas, a detailed area statement was compiled of the forests in the Melghat Taluk according to the revised classification of forest tracts as notified in the local Gazette, and for purpose of re-aligning the forest boundaries in the Kheri District, and making exchanges of lands, the areas of the lands affected were deduced. For the Kumaun Division, as well as for the leased forests of Tehri-Garhwal, statements were prepared giving details of areas of forest blocks and compartments for Working-Plans purposes, and numerous other areas were deduced for special purposes chiefly connected with Forest Working-Plans. The area statements were recorded on maps of various scales.

The forest areas in 15 standard 4″ sheets of Oudh, 28 sheets of Assam, 12 sheets of Burma, 6 of the Punjab, and 14 sheets of the Central Provinces were also deduced during the year.

Provincial map records.

16. The map records of the forests in the several Provinces, under the Government of India as well as Madras, have been posted up. These maps comprise a series of the best available maps on various scales for each forest Reserve, District maps illustrating the Reserved and Protected forests according to Forest Divisions, and Provincial maps showing forests by Forest Circles or Conservators' charges; also a map of India on which is shown the entire forest areas that have been gazetted to date under the Indian Forest Laws. The latter acts as an index to the several Provincial portfolios.

17. The tabulated statements as well as the alphabetical lists connected with the foregoing map records are fairly advanced towards completion. These statements, which are in bound volumes, contain references to the best available forest maps of each Reserve, as well as the numbers and dates of all Government Notifications whereby each forest has been constituted a Reserved or Protected forest, and numbers and dates of Notifications authorizing changes from time to time in forest boundaries.

Alphabetical lists of best available maps.

This branch of the work continues to be most ably carried on by Mr. Descubes.

18. During the year a catalogue has been compiled and printed of the maps in deposit in the Forest Survey Office; it contains 250 pages and the maps are recorded under the following headings:—

Catalogue of Forest Maps.

(*i*) Forest maps of areas surveyed and published by the Forest Survey Branch.

(*ii*) Forest and other maps published by the Forest Survey Branch for special purposes.

(*iii*) Forest maps surveyed and published by the Survey of India and Madras Revenue Surveys.

(*iv*) Other maps published by Survey of India Department, on which forest areas have been located and sketched in in the Forest Survey Office.

(*v*) Other maps in deposit on which no forest areas are entered at present.

The catalogue contains a complete list of printed maps that are at present available in the Forest Survey Office for forest purposes.

19. In Appendix C will be found a summary of the original drawings under preparation or published during the year, as well as other miscellaneous office work executed by the Forest Survey Branch.

Map-drawing.

20. Five standard 4″ sheets of the Kumaun and Garhwal forests have been reproduced, and copies on the 2″ scale supplied to the Conservator of the Central Circle, and a map of the Kumaun Division on the ¼″ scale, showing forest details, has also been published for that circle.

North-Western Provinces and Oudh, Central Circle.

21. For the School Circle six Range maps on the scale of 1″=2 miles, and a map of the "Nichla Susa Working-Circle" on the scale of 1″=4 miles, have been published; one Range map has gone to press and two sheets of the leased forests in Tehri-Garhwal on the 4″ scale are in progress.

School Circle.

22. Of the Oudh maps one sheet on the 4″ scale has been published, ten sheets have gone to the press, and twelve sheets on a similar scale are in progress; an index map to the forest surveys in Gonda, Bahraich and Gorakhpur on the scale of 1″=8 miles has gone to the press.

Oudh Circle.

23. For the Punjab, three sheets of the Bashahr Survey on the scale of 4″=1 mile have been published and nine sheets have gone to press. A chart of triangulation (sheet No. 332) on the scale of 1″=1 mile has also gone to press,

Punjab.

as well as an index map to the forest surveys in the Chamba State, on the 1″=8 miles scale. Seven sheets on the 4″ scale and five sheets on the 1″ scale of the Bashahr Survey are in progress, as well as five charts of triangulation on the 1″ scale.

Assam.

24. Three sheets of the Goalpara District on the scale of 4″=1 mile have been published; twenty-one sheets on a similar scale are in the press and four sheets are in progress.

Berar.

25. For Berar, five special maps of reserves on the 8″=1 mile scale and two on the 4″ scale have been published. Three sheets of the Melghat Taluk on the 1″ scale are in the press, and three Taluk maps of Mangrul, Malkapur and Darwa on a similar scale are in progress.

Central Provinces (Northern Circle), Jabbalpur.

26. During the year thirty-three sheets containing forests in the Jabbalpur Division on the 4″ scale have been published; fourty-two sheets of the same series have gone to press and fourteen sheets are in progress.

Narsingpur and Saugor.

27. Seven sheets of the Narsingpur forests on the 4″ scale are in progress; and an index map to the forest surveys in the Saugor District on the 1″=8 miles scale has been published.

(Southern Circle) Chanda.

28. The six sheets of the Ahiri forests in the Chanda District on the 4″ scale, reported last year as having been in the press, have now been published.

Raipur.

29. Fourteen sheets on the 4″ scale of the forests in the Raipur District have been published during the year; seven sheets of the same series are in the press and nine sheets are in progress.

Bhandara.

30. The thirteen sheets of the Bhandara forests reported last year as being in the press have been published, and eight others are nearly ready for publication.

Nagpur and Chindwara.

31. An index map on the 1″=16 miles scale to the forest surveys in the districts of Nagpur and Chindwara has passed through the press, and three standard sheets on the 4″ scale of the forests in the Nagpur Division are in progress.

Lower Burma, Tenasserim Circle.

32. A revised edition of the index map to the forest surveys in the Tenasserim Circle of Lower Burma has been published during the year; ten standard sheets of the forests in this Circle on the 4″ scale have gone to the press and six sheets are all but ready for the press.

Pegu Circle.

33. For the Pegu Circle the map of the Kabaung forests on the scale of 1″=1 mile has been published.

Upper Burma, Pyinmana.

34. Three sheets on the 4″ scale of the forests in the Pyinmana Division are in an advanced stage of completion.

Tracings and other miscellaneous work.

35. For the Forest Department and for various District Officers 177 tracings were prepared; 1,497 maps were cut up and mounted in book form, and 2,730 printed maps were coloured, and a variety of other miscellaneous work for forest purposes was also turned out. To twenty-nine published sheets the forest-growth record was added.

36. During the recess months or as opportunities offered thirty apprentices and colorists were trained for Forest Survey field work; five men qualified in traversing, twenty-four in plane-tabling, and one in triangulation.

Training of surveyors.

EXPENDITURE FOR THE YEAR.

37. The expenditure for the year incurred by the Forest Survey Branch, on account of Provincial surveys in the several Provinces under the Government of India was R1,08,800, and the total expenditure, including the Imperial charges for the head-quarters offices for special and other work done for the Forest Department, as well as other charges outside the Provincial survey operations that were in progress during the year, was R1,37,900 against R1,25,513 expended in the previous year. The increase in expenditure is due chiefly to the fact of the detail survey of the Pyinmana forests in Upper Burma having been taken in hand during the year.

Total Expenditure.

38. Included in the above figures is the sum of R6,186 on account of work done in the Survey of India Photo-zinco Office at Dehra Dun and for maps received from the Calcutta office.

Payments made to Survey of India Department.

39. The expenditure on account of Provincial surveys has been adjusted in accordance with Government of India (Revenue and Agricultural Department) Resolution No. 9 F., dated 2nd July 1890, and the various figures are as follows:—

Expenditure on Provincial surveys.

	R
Punjab	11,742
Central Provinces	52,285
North-Western Provinces and Oudh	13,167
Assam	2,025
Berar	486
Burma	29,095

The Assam charges are chiefly on account of photozinco, and publishing charges for maps and arrears of map-drawing; and those against Berar are for the drawing of 1″ maps.

40. Appendix D. exhibits in detail, and shows under Provincial and Forest Divisional headings, the expenditure for the year under report.

Expenditure by Forest Divisions.

41. The cost-rates of the several Provincial surveys are recorded under the headings of the respective Provinces in which surveys were in progress, and they are also tabulated in Appendix E.

Cost-rates.

42. During the field season of 1894-95 survey operations by the Forest Survey Branch will be carried on in the following Forest Divisions:—

Programme for 1894-95.

(i)	Balaghat		Central Provinces.
(ii)	Nagpur	Sathpura Range	Central Provinces.
	Chindwara	Sathpura Range	Central Provinces.
	Seoni	Sathpura Range	Central Provinces.
(iii)	Raipur		Central Provinces.
(iv)	Narsingpur		Central Provinces.
	Saugor		Central Provinces.
(v)	Bahraich and Gonda		Oudh.
(vi)	Chamba		Punjab.
(vii)	Salween		Burma.
	Pyinmana		Burma.

CENTRAL PROVINCES FOREST SURVEYS.

Central Provinces surveys.

Mr. E Litchfield, Assistant Superintendent, Nagpur, Seoni and Chindwara.
Mr. T. S. Marten, Extra Assistant Superintendent, Narsingpur.
Mr. J. Marten, Sub-Assistant Superintendent, Raipur.
Mr. C. Litchfield, Sub-Assistant Superintendent, Balaghat.

43. In the Central Provinces four detachments of the Forest Survey Branch were employed upon field operations during the year. The Forest Divisions operated on by each detachment were (i) Narsingpur, (ii) Raipur, (iii) Balaghat, and (iv) Nagpur with Seoni and Chindwara, each of which was under the immediate supervision of an European Assistant as shown in the margin.

Duration of field season.

44. The several survey detachments took the field on various dates between 9th November and 9th December, and closed work in June.

New surveys.

45. The survey of the Reserved forests in Narsingpur, Raipur and Balaghat was in continuation of the operations of the previous year. The operations in the Sathpura Range extending through Nagpur, Seoni and Chindwara were commenced during the year under report, and were taken up by the detachment which had completed the survey of the Goalpara forests in Assam during the previous year.

Areas surveyed and cost-rates.

46. The following statement shows the areas surveyed by each detachment and the cost-rate per square mile of each branch of the work :—

	Area in square miles and cost rate per square mile.	Triangulation	Levelling.	4" and 16" detail survey.	Expenditure of survey detachment.	REMARKS.
Narsingpur	Area	...	...	185	...	
	Cost-rate	...	...	R54 7	10,128	
Raipur	Area	...	52*	165	...	* Linear miles.
	Cost-rate	...	R16·7	R65·7	11,709	
Balaghat	Area	356	...	184	...	
	Cost-rate	R6 8	...	R40 1	9,806	
Nagpur with Seoni and Chindwara.	Area	1,072	...	174	...	
	Cost-rate	R5 4	...	R56	15,633	
Total areas and expenditure		1,428	52	708	47,276	

The cost-rates under detail survey include the cost of preparing the distribution of forests and soil records.

Expenditure.

47. In addition to the figures given in the last column a sum of R4,483 was expended in the Jabbalpur and Bhandara Divisions and R350 in the Chanda Division on account of drawing fair sheets and of printing and publishing cyano type and photozinco maps of the previous season's surveys, and an expenditure of R176 was incurred in the Saugor Division for computations and plotting in advance of the field work, making in all a total expenditure

during the year of R52,285 on account of surveys, by the Forest Survey Branch, in the Central Provinces for 1893-94.

48. For purposes of comparison a similar statement to the one above is given for the previous year of 1892-93.

Comparison of results with previous year.

	Area in square miles and cost-rate per square mile.	Triangulation.	Levelling.	4" and 16" detail survey.	Expenditure of survey detachment.	Remarks.
Narsingpur	Area	274	...	90	...	
	Cost-rate	R5	...	R57·9	6,588	
Raipur	Area	...	131*	186	...	* Linear miles.
	Cost-rate	...	R12	48 5	10,609	
Bhandara	Area	...	...	80	...	
	Cost-rate	...	...	R53·9	4,318	
Balaghat	Area	...	...	89	...	
	Cost-rate	...	...	R49·6	4,415	
Mandla	Area	...	...	117	...	
	Cost-rate	...	...	50·6	5,920	
Total area and expenditure		274	131	562	31,850	

49. The cost-rates are calculated on the actuals spent on each branch of the work including the computations, mapping and a proportionate amount of the Superintendent's pay and allowances, as well as the cost of instruments purchased during the year.

Details included in cost-rates.

50. In the Narsingpur District no triangulation was done, as the entire forest area had been triangulated in the previous year, nor was any additional traversing required for any of the districts under survey.

Triangulation and traversing.

The triangulation reported for Balaghat and Seoni and part of Nagpur was done by Mr. Nichol, and the balance of the triangulation in the Nagpur District was done by Mr. E. Litchfield.

51. In the Raipur District it was found necessary, for purposes of running instrumental contours, to carry on levelling operations in places where it had not been possible to fix a sufficient number of trigonometrical points.

Levelling.

52. The detailed survey was tested by running 175 linear miles of check lines through the work, and the instrumental contours that were run at 250 feet vertical intervals throughout the work in the Central Provinces also answered as checks on the topographical survey.

Checks applied to topographical survey.

53. As the surveys progressed the 16" boundary records were compared with the settlement records, which are on a similar scale, and the Settlement Officer's attestation to the accuracy of the boundaries was obtained.

16" boundary surveys.

54. All the detachments suffered more or less from malarial fever and more particularly the surveyors employed in Balaghat and Raipur, and the fact of the Raipur forests that were operated on during the year being situated in remote parts (on the Madras border) and being difficult to access, combined with the unhealthiness of the district, tended to increase the cost-rates of the survey in the Raipur District.

Health of the Establishment.

55. Mr. W. H. Reynolds, Superintendent of Forest Surveys, was in the Central Provinces from the 5th February to the 4th March and visited in turn each of the field parties.

Superintendent's inspection.

RAIPUR.

56. The forest surveys in the Raipur District were in continuation of the operations of the previous season; the work was confined to the South Sihawa Range extending through sheets 188, 189, 209 and 210.

Raipur surveys.

The detachment under the charge of Mr. J. Marten, Sub-Assistant Superintendent, left recess quarters on the 11th November; field work was commenced early in December, and the Surveyors closed work on the 25th June and returned to head-quarters.

57. The area topographically surveyed on the 4″ scale was 145 square miles, whilst 20 square miles were surveyed on the 16″ scale, making a total of 165 square miles, as compared with an area of 186 square miles in the previous season; 160 linear miles of forest boundaries were also surveyed. The country operated on was exceedingly difficult and sparsely populated, and the forest tracts are situated in a remote part of the district which borders on Madras, and are difficult of access.

Area topographically surveyed.

58. All forest boundaries surveyed during the season were compared with the settlement records and found to agree.

Comparison with settlement records.

59. In addition to the tests applied to the plane-table work, 52 miles of levels were run in order to fix bench marks for laying down the measured contour lines. This was found necessary as the nature of the country under survey was most intricate and covered with dense forests which rendered the use of the tangent scale clinometer most difficult.

Levelling.

60. The Superintendent of Forest Surveys was in the Raipur District early in February and again towards the end of the month, and discussed with Mr. Marten the progress of the work and cleared up all questions that were brought before him.

Superintendent's inspection.

61. The progress of the survey is illustrated on the Raipur Index map, and the details of the field work are recorded in Appendix A.

Raipur Index map.

62. The total expenditure for the year on account of field and office work, and including all charges, amounts to R11,709. The cost of the season's work,

Cost.

estimated on the area plane-tabled, and including the 16″ boundary surveys and the preparation of the record of distribution of forests and classification of soils, etc., was R65·7 against R48·5 in the previous year. The spirit levelling operations cost R16·7 per linear mile. The cost-rates of the season's topographical work in this district are higher than usual; this is due to the facts recorded in paragraphs 57 and 58 of this report.

Health of Establishment.

63. The health of the Native Establishment was, throughout the field season, very bad, and a great deal of Mr. Marten's time was occupied in attending to the sick at the different camps.

NARSINGPUR.

Narsingpur surveys.

64. The survey of the Narsingpur Reserved forests was resumed in continuation of the previous year's operations. The detachment under the charge of Mr. T. S. Marten, Extra Assistant Superintendent, took the field early in November, and field oparations were commenced before the close of the month and were continued until the end of May.

Area topographically surveyed.

65. The triangulation of the entire forest area having been completed during the previous year, and sufficient traverse data being available, it was only necessary for this detachment to continue the topographical survey of the forests.

On the 4″ scale an area of 138 squares miles was surveyed in detail and 47 square miles were completed on the 16″ scale, making a total outturn of 185 square miles of topographical work, included in which is 373 linear miles of forest boundaries.

Tests applied to topographical work.

66. In addition to the tests applied to the plane-table work by laying off measured contours at 250 feet vertical distances, a vast amount of check surveys were run through the area topographically surveyed and the work stood the tests that were applied.

Forest-growth and soil records.

67. The usual record of forest distribution and classification of soils was prepared for all areas that were topographically surveyed.

Comparison of 16″ boundary records.

68. In the Srinagar and Bachai Ranges all boundaries of forests that were surveyed on the 16″ scale were compared with the new settlement maps and duly attested by the Settlement Officer, Mr. DeBrett, C.S. The balance of the boundary work will be compared as the settlement survey of the district progresses.

Disputed boundary.

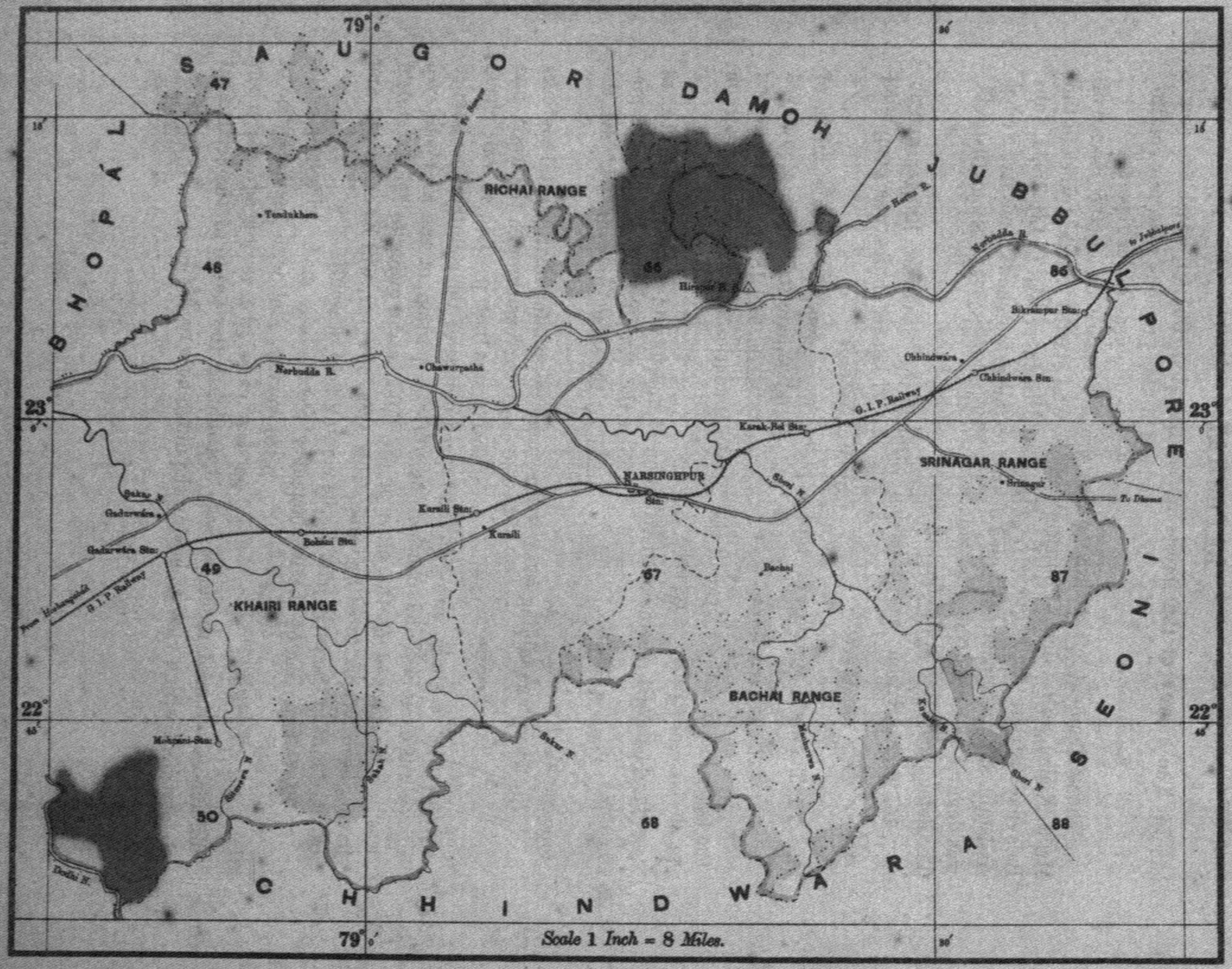
69. The disputed boundary touching on the Batku (No. 6) forest having been finally settled, the field sheets were revised according to the Settlement Officer's decision.

Superintendent's inspection.

70. Mr. Reynolds, Superintendent of Forest Surveys, was in the Narsingpur District from the 27th February to the 4th March and inspected the work of the field party.

FOREST DEPARTMENT

INDEX TO THE FOREST SURVEYS IN THE NARSINGHPUR DIVISION



REFERENCES.	
Topographically surveyed on 4″ scale, previously reported.	
Do. Do. during 1893-94.	
Balance to be surveyed on 4″ scale.	

The numerals 67 indicate the Surveyor General's numbers to the 1 inch Standard Sheets, Index of 1888.

Photoincographed at the Office of the Trigonometrical Branch, Survey of India, Dehra Dun, August 1893.

71. The Narsingpur Index map illustrates the progress of the survey, and the details of the season's field work will be found in Appendix A.

Narsingpur Index map.

72. The total expenditure for the year for the Narsingpur detachment, including all charges, was R10,128.

Cost.

The cost-rate per square mile for the season's topographical work, including office and field operations, and estimated on the area plane-tabled, is R54·7 as compared with R57·9 in the previous year.

73. Mr. Marten reports that to a great extent sickness prevailed throughout the field season; the men suffered chiefly from fever, dysentery and influenza, and several of them died.

Health of the party.

BALAGHAT.

74. The survey of the forests in the Balaghat District, which was commenced in the previous year, was continued during the year under report.

Balaghat survey.

The detachment left Dehra on the 9th November under the charge of Mr. J. Nichol, Sub-Assistant Superintendent, who started the field work in the Balaghat District. Subsequently, on the 19th December, Mr. C. Litchfield, Sub-Assistant Superintendent, assumed charge of the detachment, and Mr. Nichol was deputed to extend the triangulation into the Nagpur and Seoni Districts. The detachment was in the field until the end of June.

75. Triangulation was extended through the Sonawari Range, and an area of 356 square miles was completed by Mr. Nichol.

Triangulation.

76. The total outturn of topographical work was 184 square miles, of which 166 square miles were surveyed on the 4″ scale and 18 on the 16″ scale; the latter includes the survey of the forest boundaries, referred to in paragraph 74 of last year's progress report.

Area topographically surveyed.

77. The usual records of distribution of forests and density of growth, as well as the classification of soils, was prepared by the same surveyors who did the topographical work.

Forest and soil records.

78. The plane-tabling was tested as usual by running instrumental contours and check surveys through the work, and where it was not possible to run check surveys with a chain, owing to the rugged nature of the country, the detailed survey was examined and checked *in situ*. A portion of the area surveyed was left unchecked at the close of the field season owing to Mr. Litchfield having been incapacitated by fever; this area, however, will be examined and checked during the early part of the coming field season.

Check surveys.

79. Comparison of the 16″ boundary records was made with the settlement survey, and with the exception of a few cases, the records agreed; where differences occurred the facts were brought to the notice of the Settlement Department with a view to having the differences rectified.

16″ boundary survey.

80. The Superintendent of Forest Surveys was in the Balaghat District from the 10th to the 14th February and examined the progress of the field work.

Superintendent's inspection.

81. The Balaghat Index map illustrates the progress of the field work, and the details of the outturn of work are given in Appendix A.

Balaghat Index map

82. The expenditure on field and office work, inclusive of al other charges, was R9,806 against R7,733 in the previous year.

Cost.

The cost-rate of the season's 4″ and 16″ detail survey, inclusive of the cost of preparation of forest distribution and soil records, and estimated on the area plane-tabled, is R40·1 per square mile, against R49·6 per square mile in the previous year, and the triangulation cost R6 8 per square mile.

83. Balaghat is a notably unhealthy district, and consequently the surveyors were constantly ailing, and the officer in charge of the detachment was himself incapacitated for some time before the close of the field season.

Health of party.

NAGPUR.

84. The survey of the Sathpura Range of forests was taken in hand during the year. This work was undertaken in accordance with the programme sanctioned by the Chief Commissioner in Secretary's letter No. 6535-474, dated 11th September 1891.

Nagpur survey.

The forests under survey extend across the Districts of Nagpur, Seoni and Chindwara, and comprise for the most part what was originally known as the great Sathpura Reserves.

The survey detachment under the charge of Mr. E. Litchfield, Assistant Superintendent, left Dehra on the 8th December, and field work was started before the close of the month. The last of the surveyors closed his field work on the 5th July.

85. This survey being a new one some difficulty and delay was experienced at the commencement of the field season in obtaining labour, but after consulting with the local authorities and offering higher wages labour came in, but for the first month or so the supply was very uncertain.

Difficulties in obtaining labour.

86. Triangulation was extended over an area of 1,072 square miles, 542 of which covers the forests in the Nagpur District, and the balance extends into Seoni and Chindwara. Of the area triangulated, 354 square miles was completed by Mr. E. Litchfield, and the rest of the work was done by Mr. Nichol.

Triangulation.

87. The total area plane-tabled is 174 square miles, of which 148 square miles were surveyed on the 4″ scale and 26 square miles on the 16″ scale. With the exception of 13 square miles the whole area topographically surveyed has been examined and tested in the usual manner, and the records of forest-growth and soils were prepared as usual.

Topographical survey.

88. The length of forest boundary surveyed was 155 miles, on which were fixed the positions of 1,485 pillars. There is some confusion in the numbering of the pillars while some pillars have no numbers at all. The Divisional Forest Officer

Numbering of boundary pillars.

expressed his intention of re-numbering all the pillars during the recess months, and if this is done it will necessitate the boundaries being gone over again by a surveyor.

16″ boundary surveys.

89. The forest boundary sheets on the 16″ scale were compared with the boundaries of 99 adjacent villages surveyed by the Settlement Department, and with few exceptions no revisions were necessary. The boundary field sheets have been attested by the Assistant Settlement Officer.

Superintendent's inspection.

90. The Superintendent of Forest Surveys was in the Nagpur District from the 14th to the 23rd February, and discussed the progress of the field work with the officer in charge of the field party and also examined the accounts.

Nagpur Index map.

91. The Nagpur Index map shows the progress of the survey, and the details of the field work will be found in Appendix A.

Cost.

92. The sum of R15,633 was expended during the year on the forest surveys in the districts of Nagpur, Seoni and Chindwara. This includes the cost of field and office work as well as all other charges connected with this survey.

The cost-rate for the triangulation, including computations, was R5·4 per square mile, and the topographical survey, with the 16″ boundary surveys, including the preparation of the record of forest distribution and classification of soils, cost R56 per square mile. This being the first year of the survey no comparison can be made with previous year's cost-rates, but the rates compare favourably with rates for similar work done by the Forest Survey Branch in the other districts of the Central Provinces.

PUNJAB SURVEY.

Bashahr survey.

93. In the Punjab the survey of the Bashahr State was resumed in continuation of the previous year's operations.

The surveyors were in the field in October and November 1893 and again took the field in the summer of 1894 to complete, on the 4″ scale, a balance of scattered areas in the Chini and Pabar Ranges which were left unfinished in the previous year, and, with the exception of a small tract in the south-east corner of the State, the 1″ areas have also been completed. This practically completes the survey of the Bashahr State.

Supervision of detail survey.

94. The topographical operations in the upper part of the State or in the Chini Range were supervised by Mr. E. Litchfield, Assistant Superintendent, whilst the surveys in the Pabar Range were tested by an experienced Native Surveyor: Mr. C. Litchfield also surveyed part of the 1″ areas.

Areas surveyed and cost-rates.

95. The following statement exhibits the areas surveyed during the year and the cost-rates of the work:—

	Topographical survey.		Expenditure.
	4″	1″	
			R
Area in square miles	123	287	...
Cost-rate per square mile	R50·2	R19·3	11,723

Comparison with previous year's results.

96. The cost-rates for the previous year were :—

Topographical Survey on the 4" scale, R59 per square mile
" " 1" " " 10·5 " " "

and the total expenditure was R13,975. The cost-rate of the 4" survey is lower, whilst that of the 1" survey is higher, than in the previous year; the higher rate is chiefly due to the 1" areas operated on being situated at the extreme northern limit of Bashahr (touching on Chinese Tibet), which is most difficult of access, and much time was spent in marching to and from the field, which also tended to increase the cost of the work.

Superintendent's inspection.

97. Mr. W. H. Reynolds, Superintendent of Forest Surveys, was with the Bashahr detachment from the 7th to the 28th May, and personally supervised the field work in the Pabar Range.

OUDH SURVEYS.

Oudh surveys.

98. The forest surveys in Oudh were in continuation of the operations of the previous year; the survey detachment left Dehra on the 7th November and field operations were commenced by the middle of the month; the field season was brought to a close on the 9th June.

Supervision of field party.

99. This detachment worked under Babu Oodey Singh, a skilled and trustworthy surveyor and a man of considerable experience. The Superintendent visited the field party during the early part of the field season and arranged the details of the field work, and he again visited the party a second time in April or towards the close of the field season and examined the field records and the check surveys that had been run through the topographical work of the several surveyors.

Traversing and detail survey.

100. During the early part of the season topographical work was confined to the forests in the Bhira Range which were traversed during the previous year, but in December the surveyors moved into the Kheri forests, where they continued to work until the close of the field season. Traversing was carried on in both the Kheri and the Gonda forests, the work in Gonda being in advance for the coming season's plane-tabling.

Area surveyed and cost-rate.

101. The following statement shows the season's outturn and the cost-rates of each class of work :—

	Traversing	4" Detail survey.	Spirit levelling.	Expenditure.
				R
Area in square miles	496	356	118	...
Cost-rates per square mile . .	R4·1	R13·5	R8·4	13,167

Included in the total expenditure is a sum of R870 on account of drawing and other charges for maps of the Pilibhit forests, which were surveyed in the

previous year, and a charge of R4,500 for elephants purchased for the Oudh surveys.

Comparison with previous year's results.

102. For purposes of comparison a similar statement to the one above is given for the previous year.

		Traversing linear miles.	4" Detail surveys.	Total expenditure	
Pilibhit	Area, square miles.	94	153	R 3,125	R 5,663
	Cost-rate	R 3·1	R 18 6		
Kheri	Area	74	98	R 1,831	
	Cost-rate	R 1·7	R 17 3		
TOTAL area		168	251		

Connection of traverses with fixed points.

103. Full use was made of all masonry trijunction pillars in or near the forest tracts under survey, for which numerical data of previous surveys were forthcoming. These permanent pillars or platforms were used as initial and closing points for the Forest Survey traversing, and the final results of the traversing were computed in the same terms as the Oudh Revenue Survey. This was done, because it was not possible to triangulate the country and there are no existing trigonometrical stations with which the traversing could be connected.

Levelling.

104. Spirit-levelling operations were undertaken with a view to ascertaining the best means of draining the "phantâs" or extensive patches of grass lands which are scattered throughuot the sál forests.

Nature of country operated on and health of Establishments.

105. The country operated on in Oudh was comparatively easy to survey, and no difficulties were experienced in obtaining labour and supplies, and the health of the establishment was good throughout the season.

Re alignment of Nepal boundary.

106. During the course of the survey of the Kheri forests it was observed that the Mohan River, which forms the $\frac{\text{Kheri}}{\text{Nepal}}$ boundary for some 74 miles, had in very many places changed its course since the old survey in 1868-69 had been made. The river has a tendency to spill southwards, and during the rains it inundates considerable portions of the Kheri forest tracts and the water remains on the low-lying and undrained lands long after the close of the rainy season, and no doubt this is the chief cause of the "phantas" or existence of the grass lands that are met with in the Kheri forests. Some of the spills from the Mohan have, during recent years, become well-defined channels, and it is not improbable that at some future date the whole of the river may be diverted southwards and a vast portion of the Kheri sál forests would then be thrown on to the Nepal side of the river.

The above facts were, at the close of the field season, brought prominently to notice, and the Government of India have ordered the re-alignment of the Nepal boundary which follows the channel of the Mohan River as it existed when the boundary was first settled. The alignment of this boundary will be taken up during the coming field season.

BURMA SURVEYS.

Burma surveys.

107. In Burma, operations by the Forest Survey Branch were carried on in the Tenasserim Circle of Lower Burma as well as in the Pyinmana District of Upper Burma, and were in continuation of the operations of the previous year.

Supervision of the field parties.

108 The Tenasserim detachment, which was employed in surveying the Reserved forests in the Salween Division adjoining the Siam frontier, was under the orders of Mr. T. A. Hauxwell, Deputy Conservator of Forests, who attended to the supplying of provisions and labour to the several surveyors' camps and supervised generally the work of the detachment whilst it was in his Division.

Mr. C. E. Muriel, Deputy Conservator of Forests, supervised generally the detachment working in the Pyinmana District.

Duration of field season.

109. Field work in the Pyinmana District and in the Salween Division was commenced on the 13th and 20th November, respectively, and the surveyors were in the field until the middle of May.

Area surveyed and cost-rates.

110. The following statement shows the areas operated on and the cost-rate of each class of survey :—

	Area in square miles and cost-rate per square mile.	Triangulation	Traversing	4" Detail survey	Expenditure.	
					R	
Salween	Area	...	...	112	...	R29,095
	Cost-rate	...	...	R83·3	9,333	
Pyinmana	Area	522	440	134	...	
	Cost-rate	R12·9	R10 5	R79·8	19,762	
	Total area	522	440	246	...	

No triangulation or traversing was done in the Salween Division as these branches of the work were well in advance of the topographical survey.

Included in the cost-rate for triangulation in the Pyinmana District is a sum of R2,283, which was expended on the preliminary work of triangulation during the previous year, but against which no area could then be reported as the work was incomplete.

Comparison of results with previous year.

111. The figures in the following statement for 1892-93 are noted for comparison of results and cost-rate with those of the year under report :—

		Triangulation	Traversing.	4" Detail survey.	Expenditure.	
					R	
Salween	Area	319	...	111	...	R32,906
	Cost-rate	R16	...	R81·7	14,251	
Pyinmana	Area	...	450	..	...	
	Cost-rate	...	R36·3	...	18,655*	
					* Includes R2,283 for △"	
	Total area	319	450	111		

The traversing done in Upper Burma in 1893-94 is perceptibly cheaper than that of the previous year. This is due mainly to the fact that this branch of the work, for the year under report, was done entirely by native agency and so also was the triangulation.

Professional results

112. The average angular correction on the triangulation was 8″ and on traversing it was 7″ per station. Two chains of unequal length were used for the traversing throughout, and all forest boundary pillars were utilized as traverse stations.

An average correction of 3·3 links per 1,000 was applied to the traversing, in order to deduce the rectangular co-ordinates of the traverse points to the values of the trigonometrical stations to which the traversing was connected.

Checks applied to detailed survey.

113. The detail survey was checked *in situ* and by removing 60 linear miles of check lines after the topography had been completed.

Superintendent's inspection.

114. The Superintendent of Forest Surveys, Mr. W. H. Reynolds, was with the Upper Burma detachment from the 23rd December to the 15th January, and saw that all branches of the work were fairly started ; and after suitable points had been selected for the season's triangulation and satisfactory arrangements made for provisioning each of the surveyor's camps, he proceeded to Lower Burma and inspected the work that was in progress in the forests on the Siam frontier, and was employed with the Salween detachment up to 30th January.

115. The Superintendent's thanks are due to Major Bingham, Conservator of Forests, Lower Burma, as well as to Mr. Oliver, the Conservator of Upper Burma, for the ready assistance they afforded to the survey parties. Both these officers take the keenest interest in the survey of their forests, and they are ever ready to make matters as easy as possible for the surveyors who, as a rule, work under great disadvantages and endure considerable hardships in the Burma forests.

OFFICERS OF THE SUPERIOR STAFF.

Mr W. H. Reynolds, Superintendent of Forest Surveys.

116. Mr. W. H. Reynolds was in administrative charge of the Forest Survey Branch throughout the year. He was at head-quarters during the early part of the survey year, or from the 1st October to the 9th December; on the latter date he started for Oudh and was with the Oudh detachment in the Kheri District up to the 16th December. After seeing the field work fairly started in this district, he proceeded to Burma and was with the Pyinmana detachment in Upper Burma up to the 15th January. After satisfying himself that the triangulation and other field work was fairly started and suitable arrangements had been made for provisioning the several survey camps, Mr. Reynolds proceeded to Lower Burma and inspected the field work in the Salween Division, and was there until the end of January, after which he visited each of the survey detachments working in the Central Provinces, and was engaged on the inspection of the Central Provinces parties up to the 4th March, when he returned to head-quarters, and remained there until the 15th April. During Mr. Reynolds' stay at head-quarters he assisted in the examinations of the students of the Forest School, and was appointed a member of the Board

of Control of that institution. During the latter half of April Mr. Reynolds was again with the Oudh detachment and thoroughly scrutinized the field work that had been done in the Khori District. He then proceeded to Bashahr and during the greater part of May and June he remained with this detachment and supervised the field work in the Pabar valley, and on the 30th June he returned to head-quarters, where he remained until the 4th September, on which date he proceeded to Chamba to start the survey that had been ordered of that State; he was in Chamba until the 22nd September, when he again returned to head-quarters and remained there until the close of the survey year.

Mr. E. Litchfield, Officiating Deputy Superintendent.

117. Mr. E. Litchfield held charge of the Nagpur detachment during the field season of 1893-94, and was employed on the survey of the Reserved forests in he Nagpur and Chindwara Districts. In addition to supervising the field work of his establishment he also assisted in the triangulation of the forests under survey and succeeded in turning out a satisfactory season's work. He was in the Nagpur District from the middle of December until early in July, and after a stay of about six weeks at the head-quarters, he was deputed to take up the survey of the balance of 1" work in Bashahr that had been left over from the previous season; this he accomplished before he returned to head-quarters late in the season. Mr. Litchfield had great hardships to contend against in the Bashahr survey; nevertheless he succeeded in turning out a satisfactory amount of work and his field sheets are well drawn.

Mr. E. Litchfield officiated in the 2nd grade of Deputy Superintendents from the 24th September to the 31st October 1893, and he was again promoted to officiate in the same grade from the 8th May 1894.

Mr. T. A. Hauxwell, Deputy Conservator of Forests.

118. Mr. Hauxwell, in addition to his regular forest duties, supervised the survey detachment working in his Division, and his arrangements regarding the provisioning of the several survey camps and supply of labour were most satisfactory.

Mr. C. E. Muriel, Deputy Conservator of Forests.

119. Mr. C. E. Muriel, the officer in charge of the Pyinmana Forest Division, assisted in a general way in supervising the survey work that was in progress in his Division; he was not asked to accept any responsibilities regarding the professional part of the work, but he afforded much assistance in making things easy for the surveyors by dealing with all local matters connected with the survey.

OFFICERS OF THE JUNIOR DIVISION.

Mr. T. S. Marten, Extra Assistant Superintendent.

120. Mr. T. S. Marten held charge of the Narsingpur detachment throughout the field season; he left head-quarters on the 11th November and was in the field until the 5th June. On his return to head-quarters he was employed in bringing up the office work connected with his detachment and drawing the 1" sheets of Bashahr. Mr. J Marten continues to be energetic in the field and exhibits great zeal in the management of his field establishment.

Mr. J. Marten, Sub-Assistant Superintendent.

121. From the 11th November to the 15th July Mr. J. Marten was in charge of the Raipur detachment and in addition to supervising the field work of his surveyors, he did a fair amount of levelling and instr ucted some of the younger

hands in surveying. He takes a great interest in his professional duties and is careful for the welfare of his native assistants. His outturn of field work was less than usual but this was chiefly due to the unhealthiness of the tracts he was working in.

Mr. Marten was on privilege leave from the 3rd August to 17th October 1894, and on his return to duty he was employed up to the end of the recess season on completing his field papers.

Mr J H Nichol, Sub-Assistant Superintendent.

122. Mr. Nichol during the field season was employed on triangulation in the Districts of Balaghat, Nagpur and Seoni, and his outturn of work was very satisfactory. He was in the field from the 9th November to the 19th June. During the recess months he was employed in computing the season's triangulation and in supervising generally the traverse and other computations that were in progress.

Mr. Nichol is quick and intelligent and is a careful computer and is steady and punctual in his attendance at office.

Mr. C. Litchfield, Sub-Assistant Superintendent

123. Mr. C. Litchfield was engaged on the 1″ survey of Bashahr during the months of October and November, and on the 9th December he proceeded to Balaghat to assume charge of the survey detachment working in that district. He was engaged in the Balaghat District until the 25th June, and then proceeded to Bhandara to compare with the settlement records the 16″ boundary surveys; he returned to head-quarters towards the end of July to bring up the office work connected with the Balaghat survey. Mr. Litchfield takes a great interest in his work and is zealous in the performance of his duties; he succeeded in turning out a satisfactory amount of field work athough his surveyors suffered a good deal from sickness.

Mr A. Descubes.

124. Mr. Descubes was, throughout the year, employed at the head-quarters office; he compiled a catalogue of maps that are in deposit in the Forest Survey Office, which was a heavy undertaking, consisting of 256 printed pages, and is a most useful record. He also supervised the deduction of areas and the drawing branch of the office, and continued to post up the Provincial map records. Mr. Descubes is a quick, accurate and most zealous worker, and continues to be a most valuable assistant. A proposal is before Government to improve his position and to give him a better standing in the office, owing to the responsible duties that devolve upon him in the drawing office during the Superintendent's absence on tour, as well as the heavy and responsible duties that the compilation and posting of the Provincial map records entail upon him.

NATIVE SURVEYORS.

Strength of Native Establishment

125. The average strength of the Native Establishment employed during the field season on each branch of the work was:—

Triangulation	1
Traversing	9
Levelling	2
Plotting and computing	6
Plane-tabling	75
In the field	93
At head-quarters	38
TOTAL	131

126. On the whole the Native establishments worked most creditably, and amongst the men are some highly skilled surveyors and draftsmen.

Services of Native Establishment.

Salig Ram is a good triangulator, and turns out work of a good quality; Kali Kanth Kar is an excellent accountant and a good clerk; Bhoop Singh, Oodey Singh, and Dalip Singh are good topographical surveyors and are very reliable men; Tulsi Ram, Jodu Nath, and Mahomed Husain are excellent draftsmen; and Badri Dutt is an accurate and steady computer.

Documents accompanying the Report.

127. The following statements are appended to this Report:—

I. Appendix A.—Summary of outturn of field work and computations.

II. Appendix B.—Summary of outturn of work of the field parties during the year.

III. Appendix C.—Summary of outturn of drawing and miscellaneous work.

IV. Appendix D.—Summary of expenditure from 1st October 1893 to 30th September 1894, showing the amount expended on field and office work.

V. Appendix E.—Statement showing the cost rates of work executed by the several field parties during the year 1893-94.

VI. Appendix F.—Area topographically surveyed by the Forest Survey Branch during 1893-94.

VII. Annual Form No. 61.—Summary of Revenue for the forest year 1893-94 (Imperial).

VIII. Annual Form No. 61.—Summary of Expenditure for the forest year 1893-94 (Imperial).

IX. Annual Form No. 61.—Summary of Revenue of the Forest Surveys for the forest year 1893-94.

X. Annual Form No. 61.—Summary of Expenditure of the Forest Surveys for the forest year 1893-94.

XI. Annual Form No. 62.—Account current for the forest year 1893-94.

XII. Annual Form No. 64.—Outstandings and Liabilities on account of Contractors and Disbursers for the forest year 1893-94.

W. H. REYNOLDS,
Superintendent, Forest Surveys.

DEHRA DUN;
The 28th November 1894.

Appendix A.

Summary of outturn of Field Work and Computations by the Forest Survey Department from 1st October 1893 to 30th September 1894.

No.	Punjab, Central Provinces, Assam, Burma and North-Western Provinces and Oudh Surveys.		Amount.	Remarks.
	Plane-tabling.			
1	Area plane-tabled on the scale of 4″=1 mile—			
	(a) Bashahr—Punjab	123		
	(b) Narsingpur—Central Provinces . .	138		
	(c) Raipur Ditto . . .	145		
	(d) Balaghat Dit'o . . .	166		
	(e) Nagpur Ditto . . .	148		
	(f) Bhira—Oudh	57		
	(g) Kheri Ditto	299		
	(h) Tenasserim Circle—Burma . . .	112		
	(i) Pyinmana Do. . . .	134		
		1,322	1,720	square miles.
	Area plane-tabled on the scale of 1″=1 mile—			
	Bashahr—Punjab	287		
	Area plane-tabled on the scale of 16″=1 mile—			
	(a) Narsingpur—Central Provinces . .	47		
	(b) Raipur Ditto . . .	20		
	(c) Balaghat Ditto . . .	18		
	(d) Nagpur Ditto . . .	26		
		111		
2	Boundary surveyed on 16″ scale (linear)—			
	(a) Narsingpur—Central Provinces . .	373		
	(b) Raipur Ditto . . .	160		
	(c) Balaghat Ditto . . .	238		
	(d) Nagpur Ditto . . .	193		
		964		
	Boundary surveyed on 4″ scale (linear)—		1,123	linear miles.
	(a) Kheri—Oudh	71		
	(b) Pyinmana—Burma	50		
	(c) Bhutan/Goalpara—Assam . . . boundary straight lines 30 feet wide cleared between boundary pillars	38		
		159		

No	Punjab, Central Provinces, Assam, Burma and North-Western Provinces and Oudh Surveys.		Amount	Remarks.
3	Number of plane-table stations in area surveyed—			
	(a) Bashahr—Punjab	8,169	2,25,275	
	(b) Narsingpur—Central Provinces . .	27,401		
	(c) Raipur Ditto . . .	28,071		
	(d) Balaghat Ditto . . .	54,863		
	(e) Nagpur Ditto . . .	28,532		
	(f) Bhira—Oudh	5,162		
	(g) Kheri Do.	20,056		
	(h) Bhutan / Goalpara—Assam	1,658		
	(i) Tenasserim Circle—Burma . . .	25,309		
	(j) Pyinmana Do. . . .	26,054		
4	Number of plane-table stations for testing work—			
	(a) Bashahr—Punjab	197	11,749	
	(b) Narsingpur—Central Provinces . .	1,331		
	(c) Raipur Ditto . .	3,052		
	(d) Balaghat Ditto . .	1,000		
	(e) Nagpur Ditto . .	1,568		
	(f) Tenasserim Circle—Burma . . .	212		
	(g) Pyinmana Ditto . . .	4,389		
	Triangulation.			
5	Area triangulated—			
	(a) Balaghat—Central Provinces . .	356	1,950	square miles.
	(b) Nagpur Ditto . .	542		
	(c) Seoni Ditto . .	530		
	(d) Pyinmana—Burma	522		
6	Number of Theodolite stations—			
	(a) Balaghat—Central Provinces . .	15	82	
	(b) Nagpur Ditto . .	29		
	(c) Seoni Ditto . .	22		
	(d) Pyinmana—Burma	16		
7	Number of points fixed—			
	(a) Balaghat—Central Provinces . .	57	388	
	(b) Nagpur Ditto . .	179		
	(c) Seoni Ditto . .	60		
	(d) Pyinmana—Burma	92		

No.	Punjab, Central Provinces, Assam, Burma and North-Western Provinces and Oudh Surveys.		Amount.	Remarks
	Traversing.			
8	Area traversed—			
	(*a*) Bhira—Oudh	38	936	square miles.
	(*b*) Kheri Do.	317		
	(*c*) Gonda Do.	141		
	(*d*) Pyinmana—Burma	440		
9	Number of linear miles traversed—			
	(*a*) Bhira—Oudh	23 0	607·9	
	(*b*) Kheri Do.	209·5		
	(*c*) Gonda Do.	115·0		
	(*d*) Pyinmana—Burma	260·4		
10	Number of traverse stations—			
	(*a*) Bhira—Oudh	187	6,804	
	(*b*) Kheri Do.	930		
	(*c*) Gonda Do.	736		
	(*d*) Pyinmana—Burma	4,951		
11	Connection of traverses with Trigonometrical stations—			
	(*a*) Bhira—Oudh	4	48	
	(*b*) Kheri Do.	25		
	(*c*) Gonda Do.	13		
	(*d*) Pyinmana—Burma	6		
12	Check surveys or "Partals" on 4″ and 16′ scales—			
	(*a*) Narsingpur—Central Provinces . .	103	315	linear miles.
	(*b*) Raipur Ditto . .	66		
	(*c*) Balaghat Ditto . .	6		
	(*d*) Bhira—Oudh	27		
	(*e*) Kheri Do.	51		
	(*f*) Tenasserim Circle—Burma . . .	2		
	(*g*) Pyinmana Do . . .	60		
13	Levelling—			
	(*a*) Raipur—Central Provinces . . .	52	165	linear miles.
	(*b*) Kheri—Oudh	113		
14	Number of levelling stations—			
	(*a*) Raipur—Central Provinces . .	1,040	2,649	
	(*b*) Kheri—Oudh	1,609		

No.	Punjab, Central Provinces, Assam, Burma and North-Western Provinces and Oudh Surveys.		Amount.	Remarks.
15	Number of tangent scale clinometers' observations—			
	(a) Bashahr—Punjab	1,552	7,118	
	(b) Narsingpur—Central Provinces . .	1,765		
	(c) Raipur Ditto . .	570		
	(d) Balaghat Ditto . .	1,637		
	(e) Nagpur Ditto . .	1,427		
	(f) Tenasserim Circle—Burma . . .	167		
16	Number of heights determined by tangent scale clinometers—			
	(a) Bashahr—Punjab	830	3,720	
	(b) Narsingpur—Central Provinces . .	726		
	(c) Raipur Ditto . .	282		
	(d) Balaghat Ditto . .	984		
	(e) Nagpur Ditto . .	829		
	(f) Tenasserim Circle—Burma . . .	69		
	Computations.			
17	Number of linear miles of traversing –			
	(a) Bhira—Oudh	23·0	516·0	
	(b) Kheri Do.	202 0		
	(c) Gonda Do.	90·8		
	(d) Pyinmana—Burma	200 2		
18	Number of Traverse Stations in duplicate—			
	(a) Bhira—Oudh	187	5,230	
	(b) Kheri Do.	916		
	(c) Gonda Do.	565		
	(d) Pyinmana—Burma	3,562		
19	Number of triangles in duplicate—			
	(a) Balaghat—Central Provinces . .	147	747	
	(b) Nagpur Ditto . .	332		
	(c) Seoni Ditto . .	116		
	(d) Pyinmana—Burma . . .	152		
20	Number of points fixed thereby, and of which the rectangular co-ordinates have been computed in duplicate—			
	(a) Balaghat—Central Provinces . .	57	388	
	(b) Nagpur Ditto . .	179		
	(c) Seoni Ditto . .	60		
	(d) Pyinmana—Burma	92		

No.	Punjab, Central Provinces, Assam, Burma and North Western Provinces and Oudh Surveys.	Amount.	Remarks.
21	Number of triangles worked in duplicate to determine heights—		
	(a) Balaghat—Central Provinces . . 104	702	
	(b) Nagpur Ditto . . 334		
	(c) Seoni Ditto . . . 114		
	(d) Pyinmana—Burma 150		
22	Number of points of which the heights were determined—		
	(a) Balaghat—Central Provinces . . 52	351	
	(b) Nagpur Ditto . . 167		
	(c) Seoni Ditto . . 57		
	(d) Pyinmana—Burma 75		
23	Abstract of horizontal angles in duplicate—		
	(a) Balaghat—Central Provinces . . 475	1,969	
	(b) Nagpur Ditto . . 881		
	(c) Seoni Ditto . . 297		
	(d) Pyinmana—Burma 316		
24	Number of spherical co-ordinates converted to rectangular co-ordinates in duplicate (Trigonometrical Stations and corners of sheets, etc.)—		
	(a) Saugor—Central Provinces . . 63	713	
	(b) Balaghat Ditto . . 392		
	(c) Nagpur Ditto . . 66		
	(d) Seoni Ditto . . 83		
	(e) Bashahr—Punjab 20		
	(f) Chamba Do. 67		
	(g) Gonda—Oudh 22		
25	Number of Revenue Survey co-ordinates converted to terms of Forest Survey origin—		
	(a) Saugor—Central Provinces . . . 2,451	20,548	
	(b) Balaghat Ditto . . . 4,748		
	(c) Nagpur Ditto . . . 1,769		
	(d) Seoni Ditto . . 11,580		
	Areas.		
26	Area Statement of the Kumaun Division, Working-Plan Blocks and Compartments.	1	Sheet.
27	Area Statement of the Melghat Taluk, with an Index .	1	,,
28	Exchange of lands in Kheri District, with an Index .	1	,,
29	Detailed area statement of the blocks and compartments of all Leased Forests in Teri-Garhwal.	1	,,

No.	Punjab, Central Provinces, Assam, Burma and North-Western Provinces and Oudh Surveys.	Amount.	REMARKS.
30	Map of the Government Forests in the Pilibhit District, scale 4" = 1 mile.	10	Sheets.
31	Map of the Government Forests in the Bhira Range in District Kheri, scale 4" = 1 mile.	5	,,
32	Map of the Government Forests in the Goalpara District, scale 4" = 1 mile.	28	,,
33	Map of the Government Forests in the Pyinmana District, Upper Burma, scale 4" = 1 mile.	2	,,
34	Map of the Government Forests in the East and West of Salween and part of Attaram Division, scale 4" = 1 mile.	10	,,
35	Map of the Government Forests in the District of Simla, Bashahr State, scale 4" = 1 mile.	6	,,
36	Map of the Government Forests in the Jabbalpur Division, scale 4" = 1 mile.	7	,,
37	Map of the Government Forests in the District of Raipur, scale 4" = 1 mile.	7	,,
38	Map of the Bhira Range, showing forest growth with a classified area statement and list of wells with depths, etc., scale 1" = 1 mile.	1	Sheet.
39	Classified area statement of forest growth in Goalpara Forests.	26	Sheets.

APPENDIX B.

Forest Department, Survey Branch (Imperial).

Summary of Outturn of work of the field parties during the year 1893-94.

Scale of Survey.	Number of party.	Locale of field operations.		TRIANGULATION. Instrument used.	Area triangulated in square miles.	Number of stations at which observations were taken.	Number of square miles to each point trigonometrically fixed.	Number of square miles to each height.	Secondary in which each angle is usually observed on two zeros. Number of stations fixed.	Number of triangles.	Triangular error in seconds.	Error per mile in feet.	Number of heights.	Tertiary in which two angles of each △ are observed. Number of intersected point fixed.	Number of triangles.	Error per mile in feet.	Number of heights.	SPIRIT LEVELLING OPERATIONS. Number of miles levelled over.	Number of permanent bench marks stones embedded.	Number of trigonometrical stations connected with lines of levels.	Number of permanent points fixed.	TRAVERSING. Number of stations at which theodolite was set up.	Linear miles.	Average angular error per station in seconds.	Average linear error per mile.	DETAIL SURVEY ON 1", 4" AND 16". Area in square miles.	Average number of plane-table fixings per square mile.	Number of linear miles of test lines.	Remarks.
1" and 4" = 1 mile	Forest Survey Branch.	Punjab	Bashahr	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	410 *	19	...	* Includes 287 square miles on the 1" scale.
4" and 16" = 1 mile		Central Provinces.	Narsingpur	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	185 (a)	148	103	(a) Includes 47 square miles on 16" scale.
			Raipur	...	..	...	...	...	...	..	...	...	...	...	...	...	...	52	12	7	156	...	...	...	...	165 (b)	193	66	(b) Includes 20 square miles on 16" scale.
			Balaghat	7"	356	15	6·2	6·8	10	66	6	·57	10	47	81	1·3	42	...	...	...	...	...	...	...	...	184 (c)	298	6	(c) Includes 18 square miles on 16" scale.
			Nagpur	10" & 7"	642	29	3·0	3·2	27	82	8·5	·54	27	152	250	1·0	140	...	...	...	...	..	...	...	...	174 (d)	164	...	(d) Includes 26 square miles on 16" scale.
			Seoni	7"	530	22	8·8	9·3	20	52	6	·54	20	40	64	1·1	37	...	...	...	...	...	...	...	...	...	...	...	
4" = 1 mile		Oudh	Bhira	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	187	23·0	9	7·0	57	90	27	
			Kheri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	113	...	2	11	930	209·5	7	4·4	299	67	51	
			Gonda	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	736	115·0	5·8	3·1	...	...	...	
		Burma	Tenasserim	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	112	225	2	
			Pyinmana	8"	522	16	5·7	7·0	15	20	8	·5	13	77	133	1·5	62	...	...	...	...	4,951	260·4	6·8	3·3	134	194	60	
		Grand Total		10", 8", 7"	1,250	82	...	...	72	220	...	...	70	316	527	...	281	165	12	9	167	6,804	607·9 (e)	...	...	1,720	...	315	(e) Over an area of 936 square miles.

APPENDIX C

Summary of outturn of Drawing executed by the Forest Survey Branch from 1st October 1893 to 30th September 1894.

No.	Particulars.	Number of sheets.	Remarks.
	Original Drawings.		
	NORTH-WESTERN PROVINCES AND OUDH.		
	CENTRAL CIRCLE.		
1	Kumaun and Garhwal, sheets Nos. LII, LIII (2nd edition), LIIIA, LIV (2nd edition), LIVA, scale 2″=1 mile (published).	5	
2	Map of Kumaun Division, showing the classes of Forest boundaries of Working Circles, Blocks, etc., 1893-94, scale 1″=4 miles (published).	1	
	SCHOOL CIRCLE.		
3	Map of the Ganges, Ramgarh, Jumna, Malhán and Tirsál Ranges, Dehra Dun Division, scale 1″=2 miles (published).	5	
4	Map of the Thano Working Circle, Dehra Dun Division, scale 1″=2 miles (published).	1	
5	Map of the Nichla Suswa Coppice Working Circle, Dehra Dun Division, scale 1″=4 miles (published).	1	
6	Map of the Nagsidh Working Circle, Dehra Dun Division, scale 1″=2 miles (sent to press).	1	
7	Map of the Government Forests in Teri-Garhwal, in Jaunsar Division, sheets Nos. 333 $\frac{N.E.}{4}$, 348 $\frac{N.W.}{3}$, scale 4″=1 mile (in progress).	2	
	OUDH CIRCLE.		
	Pilibhit.		
8	Map of the Government Forests in the Pilibhit District, sheets Nos. 82$\frac{S.E.}{2}$, and 98$\frac{S.W.}{1}$, scale 4″=1 mile (published).	1	
9	Map of the Government Forests in the Pilibhit District, sheets Nos. 82$\frac{N.E.}{2 \text{ and } 4}$, 82$\frac{S.E.}{4}$, and 98$\frac{S.W.}{3}$, 97$\frac{S.W.}{3}$, 98 $\frac{N.W.}{1}$, 98$\frac{N.W.}{2}$, 98$\frac{N.W.}{3}$, 98$\frac{N.W.}{4}$, 98$\frac{S.W.}{2}$, and $\frac{S.E.}{1}$, 98 $\frac{S.E.}{3}$ and 99$\frac{N.E.}{1}$, scale 4″ = 1 mile (sent to press).	9	
	Kheri.		
10	Map of the Kheri District, sheet No. 100$\frac{N.E.}{3 \text{ and } 4}$, scale 4″ = 1 mile (sent to press).	1	
11	Map of the Government Forests in the Kheri District, sheets Nos. 99 $\frac{N.E.}{1 \text{ and } 2}$, 99$\frac{S.E.}{4}$, 99$\frac{S.E.}{2}$ and 114$\frac{S.W.}{1}$, 99 $\frac{N.E.}{4}$ and 114$\frac{N.W.}{3}$, 100 $\frac{N.E.}{2}$, 113 $\frac{N.W.}{1 \text{ and } 3}$, 113 $\frac{S.W.}{1}$, 113 $\frac{S.W.}{3}$, 113 $\frac{S.W.}{4}$, 114 $\frac{S.W.}{3}$, 115 $\frac{N.W.}{1}$, 115 $\frac{N.W.}{3}$ and $\frac{S.W.}{1}$, scale 4″ = 1 mile (in progress).	12	
	Bahraich Gonda and Gorakhpur.		
12	Index to the Forest Survey in the Bahraich, Gonda and Gorakhpur Districts, scale 1″=16 miles (sent to press).	1	

No.	Particulars.	Number of sheets.	Remarks.
	Punjab.		
	Bashahr.		
13	Map of the Government Forests in the District of Simla, Bashahr State, sheets Nos. 347 $\frac{N.\ W.}{1}$, 347 $\frac{N\ W.}{4}$, 347 $\frac{N.\ E.}{4}$, scale 4″ = 1 mile (published).	3	
14	Map of the Government Forests in the District of Simla, Bashahr State, sheets Nos. 331 $\frac{S.\ E.}{2}$, 331 $\frac{S.\ E.}{4}$, 331 $\frac{S\ W.}{2}$, 331 $\frac{S.\ W.}{4}$, 332 $\frac{N.\ E.}{3}$, 332 $\frac{S.\ E.}{1}$, 333 $\frac{N.\ W.}{2}$, 346 $\frac{N.\ E}{3}$, 347* $\frac{N.\ E.}{3}$, scale 4″ = 1 mile (sent to press).	9	
15	Chart of Bashahr Triangulation, sheet No. 332, scale 1″=1 mile (sent to press).	1	
16	Map of the Government Forests in the District of Simla, Bashahr State, sheets Nos. 331$\frac{S.\ E.}{1}$, 331$\frac{S.\ E.}{3}$, 332$\frac{N.\ E.}{2 \text{ and } 4}$, 333$\frac{N\ E.}{1}$, 333$\frac{N.\ E.}{3}$, 333$\frac{N.\ W.}{4}$, 346$\frac{S.\ E.}{4}$ and 352$\frac{S.\ W.}{3}$, scale 4″ = 1 mile (in progress).	7	
17	Map of the Government Forests in the District of Simla, Bashahr State, sheets Nos. 332, 346, 347, 352, 353, scale 1″=1 mile (in progress).	5	
18	Chart of Bashahr Triangulation, sheets Nos. 331, 333, 346, 347, 348, scale 1″=1 mile (in progress).	5	
	Chamba.		
19	Index to the Forest Survey in the Chamba State, scale 1″=8 miles (sent to press).	1	
	Assam		
20	Map of the Government Forests in the District of Goalpara, sheets Nos. 7$\frac{S.\ W.}{2 \text{ and } 4}$, 7$\frac{N.\ E.}{4}$, 7$\frac{S.\ E.}{1}$, scale 4″=1 mile (published).	3	
21	Map of the Government Forests in the District of Goalpara, sheets Nos. 1$\frac{N.\ E.}{2}$, 1$\frac{S.\ E.}{2}$, 1$\frac{N.\ E.}{4}$, 7$\frac{S.\ E.}{2}$, 7$\frac{S.\ E.}{3}$, 7$\frac{S.\ E.}{4}$, 8$\frac{N.\ W.}{1}$, 8$\frac{N.\ W.}{2}$, 8$\frac{N\ W.}{3}$, 8$\frac{N.\ W}{4}$, 8$\frac{S.\ W.}{1}$, 8$\frac{S.\ W.}{2}$, 8$\frac{S.\ W.}{3}$, 8$\frac{S.\ W.}{4}$, 8$\frac{N.\ E.}{1}$, 8$\frac{N.\ E.}{2}$, 8$\frac{N.\ E.}{3}$, 8$\frac{N.\ E.}{4}$, 8$\frac{S.\ E.}{2}$, 8$\frac{S.\ E.}{4}$, 17$\frac{N.\ W.}{1 \text{ and } 3}$, scale 4″=1 mile (sent to press).	21	
22	Map of the Government Forests in the District of Goalpara, sheets Nos. 2$\frac{N.\ E.}{4}$ and 9$\frac{N.\ W.}{3}$, 2$\frac{S.\ E.}{2}$ and 9$\frac{S.\ W.}{1}$, 8$\frac{S.\ E.}{1}$, 8$\frac{S.\ E.}{3}$, scale 4″=1 mile (in progress).	4	
	Berar.		
23	Map of the Nidha Reserve, Kelapur Taluk, scale 4″=1 mile (published).	1	
24	Map of the Ghordara Reserve, Kelapur Taluk, scale 8″=1 mile (published).	1	
25	Map of Dabdi Reserve, Darwha Taluk, scale 4″=1 mile (published).	1	
26	Map of Bhiwkund and Pownar Reserves, Wun Taluk, scale 8″=1 mile (published).	2	

* Reported in 1892-93 as being sent to press.

No.	Particulars.	Number of sheets.	Remarks.
27	Map of Bhongaon and Borgaon Reserves, scale 8″=1 mile (published).	2	
28	Map of the Melghat Taluk, District Ellichpur, Berar, sheets Nos. 1, 2, 3, scale 1″=1 mile (sent to press).	3	
29	Map of the Mangrul, Malkapur and Darwa Taluks, scale 1″= 1 mile (in progress).	3	
	CENTRAL PROVINCES.		
	Northern Circle.		
	Jabbalpur.		
30	Map of the Government Forests in the Jabbalpur Division, sheets Nos. 84 S. E./3 and 4 and 85 N. E./1 and 2, 85 N. E./2, 86 S. W./2, 86 S. E./2, 86 S. E./4, 87 N. W./2, 87 N.W./4, 87 N. E./2, 105 N. E./4, 106 N. W./1, 106 N. W./4, 106 S. W./4 and S. E./3, and 107 N. W./2, 106 N. E./4, 106 S. E./1 and 3, 106 S. E./4 and 107 N. E./2, 107 S. W./2, 107 S. W./3, 107 S. W./4, 107 S. E./1, 107 S. E./2, 108 N. W./1, 108 N. W./2, 108 N. W./3, 108 N. W./4, 108 N. E./3, 128 S. W./3, 128 S. W./4, and 129 N. W./2, 128 N. E/4, 129 N W./1 and 2, 129 N. W./3, 130 N. W./4, 130 S. W./3, 130 N. E./3, scale 4″=1 mile (published).	33	
31	Map of the Government Forests in the Jabbalpur Division, sheets Nos. 86* S. W./4, 86* S. E./3, 87* N. E./1, 87* N. E./3, 87* N. E./4, 87* S. E./1, 87* S. E./3, 105* N. W./4, 105* S. W./1, 105* S. W./3, 105* S. E./1 and 3, 106* N. W./2, 106* N. E./1 and 2, 106* S. E./2, 107 S. E./4, 108* S W./1 and 2, 108* N. E./1, 108 S. E/1, 108 S. E./3, 108 S. E./4, 108 S. W./3, 109 N. W./3, 109 S. W./4, 128* S. E./2, 128* S. E./1 and 3, 128* S. E/4, 129* N. W./4, 129* S. W./1, 129* S. W./2, 129* S. W./3, 129* S. W./4, 129* S. E./1 and N. E./3, 129* S. E./2, 129* S. E./3 and 130 N. E./1, 129* S. E./4, 130* N. W./3, 130* S. W./1 and 2, 130* N. E./3, 130* N. E./4, 131* N. W./1, 131* N. W./3, 131 S. W./1 and 3, scale 4″= 1 mile (sent to press).	42	
32	Map of the Government Forests in the Jabbalpur Division, sheets Nos. 105 S. W./2, 105 S. W./4, 106 S. W./2, 108 S. W./4, 109 N. W./1, 109 N. W./2 109 N. W./4, 109 N. E./1, 109 N. E./2 and 4, 109 N. E./3, 109 S. W./1, 109 S. W./2, 109 S. W./3, 109 S. E./1, scale 4″=1 mile (in progress).	14	
	Narsingpur.		
33	Map of the Government Forests in the Narsingpur District, sheets Nos. 67 S. W./2 and 4, 67 S. E./3, 68 N. E./1, 68 N. E./2, 68 N. E./3, 68 N. E./4, 88 N. W./1, scale 4″=1 mile (in progress.)	7	
	Saugor.		
34	Index map to the Forest Survey in the District of Saugor, scale 1″=8 miles (published).	1	
	Southern Circle.		
	Chand.		
35	Map of the Ahiri Zemindary, District Chanda, sheets Nos. 122 N. W./4 and S. W./2, 122 S. W./3 and 4, 123 N. W./1 and 2, 123 N. W./3 and 4, 123 S. W./1 and 2, 123 S. W./3 and 4, scale 4″=1 mile (published).	6	

* Reported in 1892-93 as being sent to press.

No.	Particulars.	Number of sheets.	REMARKS.
	Raipur.		
36	Map of the Government Forests in the District of Raipur, sheets Nos. $141\frac{S.E.}{2}$ and $164\frac{S.W.}{1}$, $141\frac{N.E.}{4}$ and $164\frac{N.W.}{3}$, $187\frac{N.W.}{3}$, $187\frac{N.W.}{4}$, $187\frac{S.W.}{1}$, $187\frac{S.W.}{3}$, $187\frac{S.W.}{4}$, $187\frac{N.E.}{1}$, $187\frac{N.E.}{3}$, $187\frac{N.E.}{4}$, $187\frac{S.E.}{1}$, $187\frac{S.E.}{3}$, $208\frac{N.W.}{1}$, $208\frac{N.W.}{3}$, scale 4″=1 mile (published).	14	
37	Map of the Government Forests in the district of Raipur, sheets Nos. $187\frac{S.W.}{2}$, $187\frac{N.E.}{2}$, $188\frac{N.E.}{4}$, $188\frac{S.E.}{3}$, $188\frac{S.E.}{4}$, $207\frac{S.W.}{1}$, $207\frac{S.W.}{3}$, scale 4″=1 mile (sent to press).	7	
38	Map of the Government Forests in the District of Raipur sheets Nos. $187\frac{S.E.}{2}$, $187\frac{S.E.}{4}$, $188\frac{S.E.}{2}$, $188\frac{N.E.}{2}$, $208\frac{S.W.}{1}$, $208\frac{S.W.}{3}$, $209\frac{N.W.}{1}$, $209\frac{N.W.}{3}$, $209\frac{S.W.}{1}$, scale 4″=1 mile (in progress).	9	
	Bhandara.		
39	Map of the Government Forests in the District of Bhandara, sheets Nos. $92\frac{N.W.}{3}$, $92\frac{N.W.}{4}$, $92\frac{S.W.}{1}$, $92\frac{S.W.}{2}$, $92\frac{S.W.}{3}$, $92\frac{S.W.}{4}$, $92\frac{N.E.}{2}$, $92\frac{N.E.}{3}$, $92\frac{N.E.}{4}$, $92\frac{S.E.}{1}$, $92\frac{S.E.}{2}$, $92\frac{S.E.}{3 \text{ and } 4}$, $93\frac{N.W.}{2}$, scale 4″=1 mile (published).	13	
40	Map of the Government Forests in the District of Bhandara, sheets Nos. $93\frac{N.E.}{1}$, $93\frac{N.W.}{1}$, $93\frac{N.W.}{3}$, $96\frac{N.E.}{1}$, $96\frac{N.W.}{2}$, $96\frac{N.W.}{4}$, $115\frac{N.W.}{3}$, $115\frac{S.W.}{1}$, scale 4″=1 mile (in progress).	8	
	Nagpur-Wardah, etc.		
41	Index map to the Forest Survey in the Chindwara, Seoni, and Nagpur-Wardah Divisions, scale 1″=16 miles (published).	1	
42	Map of the Government Forests in the Nagpur-Wardah Division, sheets Nos. $72\frac{S.W.}{1}$, $72\frac{S.W.}{4}$, $73\frac{N.W.}{3}$, scale 4″=1 mile (in progress).	3	
	BURMA.		
	Pegu Circle.		
43	Map of the Kaboung Working Circle, scale 1″=1 mile (published).	1	
	Tenasserim Circle.		
44	Index map to the Forest Survey in the Tenasserim Circle scale 1″=32 miles (revised edition) (published).	1	
45	Map of the Government Forests in the East and West of Salween and part of Attaram Division, sheets Nos. $475\frac{N.W.}{2 \text{ and } 4}$ and $\frac{N.E.}{1 \text{ and } 3}$, $475\frac{S.E.}{1}$, $475\frac{S.E.}{3}$, $475\frac{S.E.}{4}$, $476\frac{N.E.}{1}$, $476\frac{N.E.}{2}$, $476\frac{N.E.}{4}$, $476\frac{S.E.}{2}$, $548\frac{N.W.}{\text{and } 4}$, $548\frac{S.W.}{1}$ and $\frac{N.W.}{1 \text{ and } 3}$, scale 4″=1 mile (sent to press).	10	
46	Map of the Government Forests in the East and West of Salween and part of Attaram Division, sheets Nos. $447\frac{N.E.}{4}$ and $\frac{S.E.}{2}$, $549\frac{S.W.}{1}$, $549\frac{S.W.}{3}$ and $\frac{S.W.}{4}$, $549\frac{N.W.}{3}$, $550\frac{S.W.}{2}$, $550\frac{N.W.}{4}$, scale 4″=1 mile (in progress).	6	

No.	Particulars.	Number of sheets.	Remarks.
	Upper Burma.		
47	Map of the Government Forests in the District of Pyinmana, sheets Nos. 270 $\frac{S.W.}{1}$, 270 $\frac{S.W.}{2}$, 270 $\frac{S.W.}{4}$, scale 4″ = 1 mile (in progress).	3	
	Miscellaneous.		
48	Table showing the progress of Forest Conservancy in the Duchy of Saxe-Coburg Gotha during 11 years (sent to press).	1	
49	Diagram showing the condition of the Forest in Saxe-Coburg Gotha, 1880-1893 (sent to press).	1	
	Tracings made.		
50	Tracings made for various Forest and District Officers .	177	
	Map colouring.		
51	Printed maps of various kinds coloured . . .	2,730	
	Mounted maps.		
52	Printed maps mounted in book form	1,497	
53	Computation volumes and other books bound . .	104	
54	Map Pasting Ferrotype prints	674	
	Catalogue of maps.		
55	Catalogue of maps in the Forest Survey Office . .	1	
	Forest Growth.		
56	Map of the Pilibhit District, showing the forest growth with a classified area statement and list of wells with depths. Scale 1″ = 1 mile.	1	
57	Map of the Government Forests in the Jabbalpur Division, Central Provinces, sheets Nos. 86$\frac{S.E.}{4}$, 105$\frac{N.E.}{4}$, 106$\frac{S.E.}{4}$ and 107$\frac{N.E.}{2}$, 106$\frac{N.E.}{4}$, 106$\frac{S.W.}{4}$ and $\frac{S.E.}{3}$, and 107$\frac{N.W}{2}$, 106$\frac{N.W.}{4}$, 107$\frac{S.E.}{3}$, 108$\frac{N.E.}{3}$, 128$\frac{S.W.}{3}$, 128$\frac{N.E.}{4}$, 128$\frac{S.W.}{4}$, and 129$\frac{N.W.}{2}$, 129$\frac{N.W.}{3}$, 130$\frac{N.W.}{4}$, 130$\frac{N.E.}{3}$, scale 4″ = 1 mile (in duplicate).	28	

APPENDIX D.

Summary of Expenditure from 1st October 1893 to 30th September 1894, showing the amounts expended in the Field and Office Works of the Forest Surveys (Imperial).

Number.	Months.	Central Provinces. Jabalpur. Office.	Jabalpur. General.	Narsingpur. Field.	Narsingpur. Office.	Narsingpur. General.	Saugor. Office.	Raipur. Field.	Raipur. Office.	Raipur. General.	Bhandara. Office.	Bhandara. General.	Balaghat. Field.	Balaghat. Office.	Balaghat. General.	Chanda. General.	Nagpur. Field.	Nagpur. Office.	Nagpur. General.	Seoni. Field.	Seoni. Office.	Seoni. General.	Chindwara. General.
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	1893.																						
1	October	11	176	...	152	252	...	..	79	187	303	121	...	46	50	...	...	...	...	...	..	.	..
2	November	180	135	...	40	372	...	...	97	281	68	128	...	40	126	...	...	...	...	...	150	350	..
3	December	43	152	520	40	839	...	...	63	193	26	75	444	91	461	..	...	...	...	...	50	75	
	1894.																						
4	January	81	99	853	2	324	...	833	23	381	39	97	215	82	53	..	...	...	...	385	60	407	
5	February	284	50	...	...	21	...	1,041	168	992	83	50	1,732	31	882	...	...	...	...	1,175	22	1,396	..
6	March	49	481	1,871	...	255	...	914	..	355	...	100	1,053	13	255	117	1,351	12	168	...	59	25	
7	April	65	236	1,038	...	102	...	1,047	..	102	.	33	768	7	102	58	1,582	52	103	358	51	...	.
8	May	104	96	957	...	50	..	1,079	..	122	6	18	780	67	50	..	1,739	16	50	..	39	...	...
9	June	46	38	...	...	100	...	...	...	211	..	...	745	50	100	175	1,608	26	100	..	51	...	.
10	July	25	175	1,313	100	539	...	2,126	...	521	...	..	688	...	228	...	1,755	..	971	...	113	50	..
11	August	4	409	...	54	155	..	...	21	315	..	113	..	..	419		...	68	376	...	227	6	67
12	September	119	...	...	18	160	176	...	25	527	...	...	...	138	60	..	...	37	220	...	245	38	...
	Total	1,011	2,047	6,550	406	3,172	176	7,040	476	4,193	525	900	6,455	565	2,786	350	8,035	211	1,988	1,918	1,067	2,347	67
		3,058		10,128			176	11,709			1,425		9,806			350	10,234			5,332			67
		52,285																					

Number.	Months.	Punjab. Bashahr. Field.	Bashahr. Office.	Bashahr. General.	Chamba. Office.	Chamba. General.	Assam. Goalpara. Field.	Goalpara. Office.	Goalpara. General.	North-Western Provinces and Oudh. Oudh Circle. Pilibhit. Office.	Pilibhit. General.	Bhira. Office.	Bhira. General.	Kheri. Field.	Kheri. Office.	Kheri. General.	Gonda. Field.	Gonda. Office.	Gonda. General.
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	1893.																		
1	October	1,035	200	50	..	..	110	100	49	...	74	22	..	...	15	1,57?	...	...	...
2	November	2,869	148	50	.	.	..	233	8	10	239	24	25	...	...	25	...	18	123
3	December	2,070	107	757	..	..	..	38	50	16	50			229	50	325	...	..	...
	1894.																		
4	January	...	102	50	..	...	...	17	25	40	25		..	218	486	108	...	.	...
5	February	91	99	50	.	..	66	10	50	21	50	...		563	46	210		...	...
6	March	...	85	...		.	119	21	...	25	...	...	..	637	20	3,314	...	...	...
7	April	...	101	66	..	.	..	37	...	22	...	..	..	719	11	350	...	.	...
8	May	...	114	50			67	15	...	8	...	..		673	10	276	..	..	...
9	June	196	119	589	7		170	35	.	48	...	...	..	729	...	133	546	17	...
10	July	197	192	651	..	.	..	6	...	86	...	.	.	40	24	138	...	58	...
11	August	191	391	142	..	...	..	49	500	101	55		..	...	3	140	...	8	...
12	September	681	220	60	4	8	...	250	...	...	...	..	.	...	75	315	...	...	...
	Total	7,330	1,878	2,515	11	8	532	811	682	377	493	46	25	3,808	740	6,908	546	101	123
		11,723			19		2,025			870		71		11,456			770		
		11,742					2,025			13,167									

Number.	Months.	Burma. Lower. Tenasserim. Field.	Tenasserim. Office.	Tenasserim. General.	Upper. Pyinmana. Field.	Pyinmana. Office.	Pyinmana. General.	Berar. Melghat. Office.	Melghat. General.	Imperial Head-Quarters.	Grand Total.
		R	R	R	R	R	R	R	R	R	R
	1893.										
1	October	...	117	300	-	315	166	16	..	2,337	7,857
2	November	...	37	90	...	223	140	..	16	3,077	9,322
3	December	...	4	158	40	...	2,207	...	...	2,106	11,279
	1894.										
4	January	...	18	100	1,523	...	230	13	...	1,833	8,755
5	February	...	7	75	1,595	50	1,733	40	...	1,508	14,194
6	March	1,905	10	2,250	780	...	913	84	...	3,875	21,116
7	April	...	...	117	...	...	117	61	...	1,469	8,772
8	May	...	...	50	1,604	...	50	30	...	1,977	10,262
9	June	404	5	455	3,953	...	3,189	20	...	1,744	15,609
10	July	2,382	68	510	46	197	294	...	...	4,410	17,906
11	August	...	39	140	...	134	53	93	28	2,445	6,747
12	September	...	42	50	...	160	50	85	...	2,408	6,171
	Total	4,691	347	4,295	9,541	1,079	9,142	442	44	29,190	1,37,990
		9,333			19,762			486		29,190	1,37,990
		29,095						486		29,190	1,37,990

APPENDIX E.

FOREST DEPARTMENT, SURVEY BRANCH (IMPERIAL).

Statement showing the cost-rates of work executed by the several Field Parties during the year 1893-94.

Number of party.	Nature and *locale* of field operations.		COST-RATE PER SQUARE MILE IN RUPEES.					Total cost, inclusive of charges for instruments.	REMARKS
			Triangulation.	Traversing.	Levelling.	DETAIL SURVEY AND PREPARATION OF MAPS ON SCALES OF			
						1"	4" and 16"		
Forest Surveys.	Punjab . .	Bashahr . . .	...	...	...	19·3	50·2	11,742 (*a*)	The cost-rate under head of levelling is per linear mile. (*a*) Includes R19 on account of Chamba computations in advance of field operations.
	Central Provinces .	Narsingpur . .	...	...	...	...	54 7	52,285 (*b*)	(*b*) Includes R4,833 on account of printing and publishing of cyanotype and photozinco maps, etc., of the Chanda, Jabbalpur, and Bhandara Divisions, and R176 on account of computations and plotting in advance of field operations for the Saugor Division.
		Raipur . . .	...	...	16 7	...	65 7		
		Balaghat . . .	6 8	...	...	...	40·1		
		Nagpur . . .	5·4	...	...	...	56·0		
		Seoni . . .							
		Chindwara . . .							
	Oudh . .	Kheri . . .	...	4·1	8·4	...	13 5	13,167 (*c*)	(*c*) Includes R 4,500 for purchase of two elephants, and R870 for photozinco and publishing charges for maps of the Pilibhit Forests.
		Bhira . . .							
		Gonda . . .							
	Burma . .	Tenasserim . .	...	...	...	...	83 3	29,095	
		Pyinmana . .	12·9	10·5	...	...	79·8		

APPENDIX F.

Area topographically surveyed by the Forest Survey Department during 1893-94.

Province.	Forest Division.	Area in square miles.			Remarks.
		Demarcated Forests.	Other lands.	Total	
Central Provinces	Narsingpur .	182	3	185	
	Raipur . .	159	6	165	
	Balaghat . .	182	2	184	
	Nagpur . .	172	2	174	
Punjab . . .	Bashahr . .	6	404*	410	*Includes 50 square miles unclassed forests. All forests in Bashahr, whether demarcated or not, are leased by the Punjab Government.
Oudh . .	Bhira . . / Kheri . .	337	19	356	
Burma . .	Tenasserim .	107	5	112	
	Pyinmana .	123	11	134	
	Total .	1,268	452	1,720	

ANNUAL FORM No. 61 (*Prescribed*).

Forest Department, India, Forest Surveys.

Summary of Revenue of the different Divisions during 1893-94.

Receipts.

	R	a.	p.
I—Timber and other produce removed from the forests by Government agency—			
a. Timber	...		
b. Firewood and charcoal	...		
c. Bamboos	...		
d. Sandal-wood	...		
e. Grass and other minor produce	...		
II.—Timber and other produce removed from the forests by consumers or purchasers—			
a. Timber	...		
b. Firewood and charcoal	...		
c. Bamboos	...		
d. Grazing and fodder grass	...		
e. Other minor produce	..		
III.—Drift and waif wood and confiscated forest produce—			
IV.—Revenue from forests not managed by Government—			
a. Duty on foreign timber and other forest produce	...		
b. Revenue from shared and private forests	...		
V.—Miscellaneous—			
a. Fines and forfeitures	...		
b. Refunds	...		
c. Other sources	56	0	0
Total Receipts	56	0	0

Summary of Expenditure of the different Divisions during 1893-94.

A.—Conservancy and Works.

	R	a.	p.
I.—Timber and other produce removed from the forests by Government agency—			
a. Timber	...		
b. Firewood and charcoal	...		
c. Bamboos	..		
d. Sandal-wood	...		
e. Grass and other minor produce	...		
II.—Timber and other produce removed from the forests by consumers or purchasers—			
III.—Drift and waif wood and confiscated forest produce—			
IV.—Revenue from forests not managed by Government—			
a. Duty on foreign timber and other forest produce	...		
b. Revenue from shared and private forests	...		
V.—Rent of leased forests and payments to Shareholders in forests managed by Government—			
VI.—Live Stock, Stores, Tools and Plant—			
a. Purchase of cattle	...		
b. Feed and keep of cattle	...		
c. Purchase of stores, tools and plant	1,972	0	0

ANNUAL FORM No. 61 (*Prescribed*)—continued.

FOREST DEPARTMENT, INDIA, FOREST SURVEYS.

Summary of Expenditure of the different Divisions during 1893-94.

	R	a.	p.
VII.—Communications and Buildings—			
a. Roads and bridges	...		
b. Buildings	...		
c. Other works	...		
VIII.—Organisation, improvement, and extension of forests—	...		
a. Demarcation	...		
b. Cost of settlements; compensation for land and rights	...		
c. Surveys	5,280	0	0
d. Working-plans	...		
e. Sowing and planting	...		
f. Protection from fire	...		
g. Other works	...		
IX.—Miscellaneous—			
a. Refunds	226	0	0
b. Law charges	...		
c. Other charges	43	0	0
TOTAL A.—CONSERVANCY AND WORKS	7,521	0	0

B.—ESTABLISHMENTS.

I.—Salaries—			
a. Conservators	...		
b. Superior officers	6,658	0	0
c/1 Upper Subordinate Establishments	50	0	0
c/2 Lower Subordinate Establishments	7,218	0	0
e. Deputation and special allowances	...		
f. Exchange compensation allowances	1,726	0	0
II.—Travelling allowances—			
a. Conservators	...		
b. Superior officers	...		
c/1 Upper Subordinate Establishments	...		
c/2 Lower Subordinate Establishments	...		
III.—Contingencies—			
a. Stationery	83	0	0
b. Carriage of tents and records	2	0	0
c. Rents, rates and taxes	1,200	0	0
d. Pay of police guards	...		
e. Official postage	418	0	0
f. Sundries	3,716	0	0
TOTAL B.—ESTABLISHMENTS	21,071	0	0
GRAND TOTAL OF EXPENDITURE	28,592	0	0

ANNUAL FORM No. 61 (*Prescribed*)—continued.

FOREST DEPARTMENT, INDIA, FOREST SURVEYS.

Summary of Revenue of the different Divisions during 1893-94.

RECEIPTS.	R	a.	p.
I.—Timber and other produce removed from the Forests by Government agency—			
a. Timber	...		
b. Firewood and charcoal	...		
c Bamboos	...		
d. Sandal-wood	...		
e. Grass and other minor produce	...		
II.—Timber and other produce removed from the Forest by consumers or purchasers—			
a. Timber	...		
b. Firewood and charcoal	...		
c. Bamboos	...		
d. Grazing and fodder grass	...		
e. Other minor produce	...		
III.—Drift and waif wood and confiscated forest produce—			
IV.—Revenue from forests not managed by Government—			
a. Duty on foreign timber and other forest produce	...		
b. Revenue from shared and private forests	...		
V.—Miscellaneous—			
a. Fines and forfeitures	...		
b. Refunds	...		
c Other sources	56	0	0
TOTAL RECEIPTS	56	0	0

Summary of Expenditure of the different Divisions during 1893-94.

A.—CONSERVANCY AND WORKS.	R	a	p.
I.—Timber and other produce removed from the forests by Government agency—			
a. Timber	..		
b. Firewood and charcoal	...		
c. Bamboos	...		
d. Sandal-wood	...		
e. Grass and other minor produce	...		
II.—Timber and other produce removed from the forests by consumers or purchasers—			
III.—Drift and waif wood and confiscated forest produce—			
IV.—Revenue from forests not managed by Government—			
a. Duty on foreign timber and other forest produce	...		
b. Revenue from shared and private forests	...		
V.—Rent of leased forests and payments to Shareholders in forests managed by Government—			
VI.—Live Stock, Stores, Tools and Plant—			
a. Purchase of cattle	4,500	0	0
b. Feed and keep of cattle	3,560	0	0
c. Purchase of stores, tools and plant	3,607	0	0
VII—Communications and Buildings—			
a Roads and bridges	...		
b. Buildings	...		
c. Other works	...		

ANNUAL FORM No. 61 (*Prescribed*)—concluded.

FOREST DEPARTMENT, INDIA, FOREST SURVEYS.

Summary of Expenditure of the different Divisions during 1893-94.

VIII.—Organization, improvement, and extension of forests—			
a. Demarcation	...		
b. Cost of settlements; compensation for land and rights	...		
c. Surveys	43,633	0	0
d. Working-plans	...		
e. Sowing and planting	...		
f. Protection from fire	...		
g. Other works	...		
IX.—Miscellaneous—			
a. Refunds	226	0	0
b. Law charges	...		
c. Other charges	135	0	0
TOTAL A.—CONSERVANCY AND WORKS	55,661	0	0
B.—ESTABLISHMENTS.			
I.—Salaries—			
a. Conservators	...		
b. Superior officers	21,958	0	0
c/1 Upper Subordinate Establishments	9,875	0	0
c/2 Lower Subordinate Establishments	17,751	0	0
e. Deputation and special allowances	869	0	0
f. Exchange compensation allowances	1,726	0	0
II.—Travelling allowances—			
a. Conservators	...		
b. Superior officers	5,089	0	0
c/1 Upper subordinate Establishments	4,626	0	0
c/2 Lower subordinate Establishments	7,966	0	0
III.—Contingencies—			
a. Stationery	83	0	0
b. Carriage of tents and records	2,078	0	0
c. Rents, rates, and taxes	1,245	0	0
d. Pay of police guards	...		
e. Official postage	438	0	0
f. Sundries	4,936	0	0
TOTAL B.—ESTABLISHMENTS	78,640	0	0
GRAND TOTAL OF EXPENDITURE	1,34,301	0	0

ANNUAL FORM No. 62 (*Prescribed*).

Forest Department, India, Forest Surveys.

Account Current for the year 1893-94.

	R a. p.	R a. p.		R a. p.	R a. p.
To cash balance	...	...	By Expenditure as per Annual Summary, Form No. 61	...	28,591 15 0
To VIII.—Assessed Taxes— Income tax—Deductions from salaries	...	1,021 6 0	By Deposits	...	...
To Revenue as per Annual Summary, Form No. 61	...	56 4 9	By Forest Cash Remittances —Local—		
To Service Funds—					
Civil Fund—Ordinary, Bengal	...	...	Remittances to Treasuries	..	...
Civil Fund—Additional, Bengal	...	...	Inter-Divisional Transfers	...	...
Military Fund—Bengal	...	...	By Advances Recoverable	...	1,12,999 7 0
Military Fund - Madras	...	...			
Military Orphan Fund—Bengal	...	...	By suspense	...	...
Uncovenanted Service Family Pension Fund—Bengal	341 4 0	...			
General Family Pension Fund	...	...	By Account Current (other Governments)—		
Hindu Family Annuity Fund	...	...			
		341 4 0			
To Deposits	...	...	Remittances to the Government of—		
To Forest Cash Remittances— Local—					
Forest cheques drawn	...	...			
Inter-Divisional Transfers	...	...	N.-W. P. and Oudh	13,310 10 0	...
To Advances recoverable	...	1,08,524 15 6	Central Provinces	45,280 1 7	...
Suspense	...	...			
			Punjab	14,874 0 11	...
To Account Current (other Governments)—			Assam	4,303 3 2	...
Remittances from Government of—			Burma	28,030 1 11	...
N.-W. P. and Oudh	83,025 4 11	...			1,05,798 1 7
Assam	233 6 0	...			
Punjab	6,450 0 0	...	By Account Current with Foreign States	...	...
Central Provinces	27,345 11 4	...			
Burma	13,029 0 0	...			
		1,30,083 6 3	Berar Suspense Account	...	451 8 0
To Inter-Departmental Transfers—					
Public Works Department	...	...			
Military Department, Bengal	206 6 1	...	By Inter-Departmental Transfers—		
Civil Department—					
Survey of India	6,392 13 0	...	Military Department	...	...
Mathematical Instrument Department	1,204 8 0	...	Civil Department	...	...
Miscellaneous	10 0 0	...	By Cash Balance	...	...
	7,607 5 0	...			
		7,813 11 1			
Total	...	2,47,840 15 7	Total	...	2,47,840 15 7

ANNUAL FORM No. 64 (*Prescribed*).

Forest Department, India, Forest Surveys.

Outstandings and Liabilities on account of Contractors and Disbursers for 1893-94.

Division.	Department Debtor.			Department Creditor.			Balance due.	
	At commencement of year.	Recoveries in cash and value of supplies and work done during the year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To Department (Outstandings).	By Department (Liabilities).
	R a. p.	R a. p.	R a. p.	R a. p	R a. p.	R a. p.	R a. p.	R a. p.
Forest Surveys	...	1,08,524 15 6	1,08,524 15 6	9,707 10 2	1,12,999 7 0	1,22,707 1 2	14,182 1 8	...

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